



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,863	09/15/2003	Makoto Nagashima	GSN-002	2136
31688	7590	07/21/2005	EXAMINER	
TRAN & ASSOCIATES 6768 MEADOW VISTA CT. SAN JOSE, CA 95135			MCDONALD, RODNEY GLENN	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 07/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/662,863	Applicant(s) NAGASHIMA ET AL.	
	Examiner Rodney G. McDonald	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1-25-05</u> . | 6) <input type="checkbox"/> Other: ____  |

500

## DETAILED ACTION

### *Claim Objections*

The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claim 8 has been renumbered 9. ***Claim Rejections - 35 USC § 112***

Claims 1-20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite because it is unclear how the deposition chambers are within the housing.

Claim 2 is indefinite because "facing target sputtering" should be "facing target sputtering chamber".

Claim 3, line 2, "said air-tight chamber" lacks antecedent basis.

Claim 5, line 2, " the wafer" lacks antecedent basis.

Claim 6, line 2, "the chamber" lacks antecedent basis.

Claim 7, line 2, "the wafer" lacks antecedent basis.

Claim 9, line 1, "the rotary chuck" lacks antecedent basis.

Claim 9, line 2, "the wafer" lacks antecedent basis.

Claim 16, line 1, "chuck" should be "a chuck".

Claim 17, lines 1 and 2, both occurrences of "the wafer" lacks antecedent basis.

Claim 17, line 2, "the target" lacks antecedent basis.

Claim 18, line 5, "surface portion" should be "film-forming surface portion".

Claim 19, line 1, "the wafer" lacks antecedent basis.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 5-9 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. (U.S. Pat. 6,641,702) in view of Sato et al. (U.S. Pat. 5,286,296).

Regarding claim 1, Shi et al. teach a fabrication system in Figs. 5 and 6. (See Figs. 5 and 6) Shi et al. teach a main housing chamber 41 provided with several small

Art Unit: 1753

chambers or stations 42. In each station is provided a planar-magnetron-sputtering cathode 43 or a pair of facing-targets-sputtering cathode 44. The main chamber and each station have their own vacuum pumping means and gas-supplying component (not shown). (Column 7 lines 1-18)

Regarding claim 2, one of the deposition chambers is a facing-targets-sputtering cathode 44. (Column 7 lines 5-7)

Regarding claim 5, a robot arm is used for moving the substrate. (See Fig. 5)

Regarding claim 6, magnetrons are coupled to the chamber through the facing target sputtering devices. (Column 7 lines 1-18)

Regarding claim 7, a chuck heater can be mounted above the substrate holder by simply replacing one of the cathodes in the sputtering station with a heating means. (Column 7 lines 27-30)

Regarding claim 8, the substrate holder 47 is rotated on its center axis via a step-motor 48. (Column 7 lines 19-22)

Regarding claim 9, the arm moves the substrates to the different coating stations. (See Figs. 5 and 6; Column 10 lines 3-12)

Regarding claim 14, the main chamber has a vacuum pump. (Column 7 lines 9-11)

Regarding claim 15, the chamber is provided with their own vacuum pumping means. (Column 7 lines 9-11)

Regarding claim 16, the substrate holder can be supported from underneath in Fig. 7b. (See Fig. 7b)

Art Unit: 1753

The differences between Shi et al. and the present claims are that the use of an inert gas as the admitted gas is not discussed (Claim 1) and utilizing the apparatus for semiconductor fabrication is not discussed (Claim 1).

Shi et al. suggest utilizing argon for the sputtering gas. (Column 1 lines 10-17)  
Sato et al. suggest inserting an inert gas such as nitrogen or argon into the transfer chamber. (Column 2 lines 63-68; Column 1-3)

The motivation for utilizing argon gas in the chambers is that it allows for sputtering of the target and preventing contamination of the deposition chambers. (Column 3 lines 4-6)

Sato et al. suggest that mutlichamber apparatus can be used for fabricating semiconductors. (Column 1 lines 8-10)

The motivation for utilizing a multichamber apparatus is that it allows for fabricating semiconductors of high complexity with different processes. (Column 1 lines 10-18)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Shi et al. by utilizing argon as taught by Shi et al. and Sato et al. and to have utilized a mutlichamber apparatus for fabricating semiconductor substrates as taught by Sato et al. because it allows for sputtering a target with prevention of contamination of the deposition chambers and for fabricating semiconductors with high complexity.

Claims 3, 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. in view of Sato et al. as applied to claims 1, 2, 5-9 and 14-16 above, and further in view of Kawakubo et al. (U.S. Pat. 6,077,406).

The difference not yet discussed is utilizing a pair of target plates (Claim 3), utilizing a pair of magnets such that magnet pole of different polarities face each other across the plasma region is not discussed (Claim 3), depositing an alloyed film is not discussed (Claim 3), utilizing a back-bias power supply is not discussed (Claim 3), utilizing DC or AC for the back bias power supply is not discussed (Claim 4) and the chambers sharing magnets is not discussed (Claim 13).

Shi et al. teach that the facing target sputtering device comprises a pair of facing target plates utilizing magnetrons. An alloy film can be deposited by utilizing target plates of different materials. (Shi et al. Column 1 lines 38-63) Shi et al. recommends utilizing a DC/RF bias for improving the microstructure of the film. (Column 6 lines 12-19) Kawakubo et al. teach in Fig. 9 utilizing facing targets such that magnet pole of different polarities face each other across the plasma region and such that the adjacent targets share the same magnets. (See Fig. 9; See Fig. 5)

The motivation for utilizing magnets such that magnet pole of different polarities face each other across the plasma region is that it allows for improving the in plane uniformity of composition of the film. (Column 8 lines 31-32)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a pair of target plates, utilized a pair of magnets such that magnet pole of different polarities face each other across the plasma

Art Unit: 1753

region, deposited an alloyed film, utilized a back-bias power supply, utilized DC or AC for the back bias power supply and utilized the chambers sharing magnets as taught by Shi et al. and Kawakubo et al. because it allows for improving the in plane uniformity of composition of the film.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. in view of Sato et al. as applied to claims 1, 2, 5-9 and 14-16 above, and further in view of Horne et al. (5,344,352).

The difference not yet discussed is where each chamber is provided with a collimator to provided collimated deposition is not discussed (Claim 10)

Horne et al. teach utilizing collimators in each deposition chamber to deposit films on a substrate. (Column 6 lines 11-26)

The motivation for utilizing collimators in each deposition chamber is that it allows for depositing at different rates on the substrate. (Column 6 lines 11-26)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized collimators in each of the deposition chambers as taught by Horne et al. because it allows for depositing at different rates on the substrate.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. in view of Sato et al. as applied to claims 1, 2, 5-9 and 14-16 above, and further in view of Scobey et al. (U.S. Pat. 4,851,095).

The difference not yet discussed is each chamber comprising a door the opens during deposition and closes when not depositing is not discussed (Claim 11).



Scobey et al. teaches utilizing shutters in front of cathodes and opening them during deposition. (Column 13 lines 56-68; Column 14 lines 24-32)

The motivation for utilizing shutters is that it allows for controlling the deposition from the targets. (Column 13 lines 56-68; Column 14 lines 24-32)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized shutters as taught by Scobey et al. because it allows for controlling the deposition from the targets.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. in view of Sato et al. and further in view of Scobey et al. as applied to claims 1, 2, 5-9, 11, 14-16 above, and further in view of Sawada et al. (U.S. Pat. 5,135,629).

The differences not yet discussed is where each chamber door comprising a baffle to catch falling particulates is not discussed (Claim 12).

Scobey et al. discussed above teach shutters which acts as doors to open deposition chambers to deposit on a substrate. (See Scobey et al. discussed above) Sawada et al. teach utilizing a baffle means on shutters to catch particles. (Column 3 lines 54-68; Column 4 lines 1-2)

The motivation for utilizing a baffle to catch particles is that it allows for prevented contamination in the deposited film. (Column 2 lines 28-35)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided baffle means as taught by Sawada et al. because it allows for preventing contamination in the deposited film.

Art Unit: 1753

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. in view of Sato et al. as applied to claims 1, 2, 5-9 and 14-16 above, and further in view of Strahl (U.S. Pat. 4,664,935).

The difference not yet discussed is the jointed pendulum to support the wafer and keep the wafer at a constant vertical distance from the target is not discussed (Claim 17).

Strahl teach utilizing a wafer holder for holding a wafer from a target where the substrate holder rocks back and forth like a pendulum and can move in the direction of the target. (Column 3 lines 59-68; Column 4 lines 1-15)

The motivation for utilizing a pendulum substrate holder is that it allows for increased step coverage. (Column 1 lines 58-63; Column 2 line 64)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a pendulum with vertical movement means as taught by Strahl because it allows for increase step coverage.

Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubs et al. (U.S. Pat. 6,899,795) in view of Ashtiani et al. (U.S. Pat. 6,497,796) and Strahl (U.S. Pat. 4,664,935).

Dubs et al. teach in Fig. 4 providing a plurality of deposition chambers 10a and 10b each having at least one magnetron target for coating. A substrate carrier 5 holds a substrate for rotation and movement in Z direction and in the X direction. The substrate is supported underneath. (See Fig. 4; Column 5 lines 40-48)

The differences between Dubs et al. and the present claims is that utilizing a magnetic field normal to the substrate is not discussed, back biasing the substrate is not discussed, and utilizing a pendulum is not discussed.

Ashtiani et al. teach utilizing a magnetic field normal to the substrate in Figs. 17A and 17B for improving step coverage. (See Figs. 17A and 17B; Column 12 lines 52-65)

The motivation for utilizing a magnetic field normal to the substrate is that it allows for improving step coverage. (Column 12 lines 52-65)

Strahl discussed above teach a substrate holder that moves like a pendulum. (See Strahl discussed above) A DC bias can be applied to the workpiece. (Column 2 lines 16-19)

The motivation for utilizing a DC bias is that it allows for improving step coverage. (Column 2 lines 16-19)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a magnetic field normal to the substrate as taught by Ashtiani et al. and to have utilized a DC bias as taught by Strahl because it allows for improving step coverage.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald  
Primary Examiner  
Art Unit 1753

RM  
July 19, 2005